

concerns laid to rest? Despite the comments of Mercer and Birbeck cited earlier, it was not by developing a detailed understanding of how the techniques worked. An understanding of how, for example, the fixative osmium reacted with tissue preparations, would not be available until much later. If researchers lack a theoretical understanding of the procedures by which putative evidence is generated, how can they establish its reliability? The alternative is to focus on the results themselves.

At first, this suggestion to examine the results of a technique in order to vindicate it would seem to lead nowhere. If skeptics are questioning the evidential status of results, how can further consideration of them resolve the concerns? In fact, this strategy is not as circular as it might appear. To see this, assume for a moment that you are pioneering a procedure for procuring evidence. What might you demand of the results of the procedure before accepting them as evidence of something in the world?

The first thing you would likely do is examine whether there was a distinguishable structure or pattern in the results. If the results seemed randomly distributed, you would conclude that you had generated noise rather than picking up a signal from an underlying phenomenon. Likewise, if cell fractionation studies had shown that enzymes were scattered helter-skelter through the cell, scientists would not have been impressed. As it turned out, there was a pattern in the results, with particular enzymes appearing in high concentrations in one fraction and low in others, and other enzymes having higher concentrations in one of the other fractions. Such a pattern suggested that the distribution of enzymes in the fractions resulted in some way from their distribution in the original organelles within the cell. Likewise, a critical indicator that electron micrographs were revealing of cell structure was that visual patterns suggestive of structure appeared in them.

Of course, the structure could have been generated by the technique itself. That is just what the charge of artifact asserts. However, often in practice the burden of proof is on the person alleging that the results are an artifact. If a plausible account of how the technique itself could generate the structure is offered, that, as we shall see, is taken as a reason to suspect artifactual findings. But scientists are impressed by structure in their results, and when they find it, they are inclined to interpret it as reflecting the phenomenon itself and not an artifact of how the evidence was produced.⁵

⁵ I asked Keith Porter (interview, 1987, University of Maryland, Baltimore County) whether, when he examined his first micrograph of a cell (see Figure 5.1), he had any doubt about whether it was revealing something about the cell. He responded no – the structure in the micrograph was just too impressive.